



UNITED STATES PATENT AND TRADEMARK OFFICE

NW

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,205	06/22/2001	Ralf Wolleschensky	P66760US0	6182

136 7590 01/27/2004

JACOBSON HOLMAN PLLC
400 SEVENTH STREET N.W.
SUITE 600
WASHINGTON, DC 20004

EXAMINER

LAVARIAS, ARNEL C

ART UNIT	PAPER NUMBER
----------	--------------

2872

DATE MAILED: 01/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/857,205

Applicant(s)

WOLLESCHEFSKY, RALF

Examiner

Arnel C. Lavarias

Art Unit

2872



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 11/18/03, have been approved.
2. The replacement drawings were received on 11/18/03. These drawings are acceptable.

Response to Amendment

3. The amendments to the specification of the disclosure in the submission filed 11/18/03 are acknowledged and accepted. In view of these amendments, the objections to the specification in Sections 3-5 of Paper No. 7, dated 5/20/03, are respectfully withdrawn.
4. The amendments to Claims 12, 14, 16-19, 21-22, 24, 26-28, 30-37, 39-43, 45-56, 58, and 60-62 in the submission filed 11/18/03 are acknowledged and accepted. In view of these amendments, the objections to the claims in Section 7 of Paper No. 7, dated 5/20/03, are respectfully withdrawn.

Response to Arguments

5. In view of the amendments made above, as well as the Applicant's remarks regarding Claims 56 and Figure 4 of Applicant's disclosure (See in particular Applicant's remarks on Pages 28-29 in submission filed 11/28/03), the Examiner respectfully withdraws the rejection of Claim 56 under 35 U.S.C. 112, 1st paragraph in Section 9 of Paper No. 7, dated 5/20/03.

Art Unit: 2872

6. The Applicant argues that, with respect to newly amended Claims 12, 22, 24, 28, 37, 43, and 58, Kobayashi fails to teach or reasonably suggest a microscope including a diffracting means for separating excitation light and emission light in the microscope beam path, and wherein the light diffracting means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means. The Examiner disagrees with Applicant's argument that Kobayashi fails to teach or reasonably suggest the microscope including a diffracting means for separating excitation light and emission light in the microscope beam path. In particular, as shown in Figure 1, the acousto-optic deflector (AOD 4 in Figure 1) intercepts both scattered light at the laser source wavelength as well as scattered light, e.g. fluorescence, from the specimen (See 15 in Figure 1). Since the acousto-optic deflector operates on the principle of diffraction, the diffraction properties, and in particular the diffraction angles for the light scattered from a diffracting surface, of the AOD are highly dependent on the wavelength of light incident on it. With the laser wavelength and the wavelength of the scattered light from the specimen being generally different, the AOD will angularly separate these two lights as they are incident on the AOD. However, the Examiner agrees that Kobayashi fails to teach or reasonably suggest the limitation that the light diffracting means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means. Therefore, the Examiner respectfully withdraws the rejections in Sections 10-14 of Paper No 7, dated 5/20/03.

7. Claims 12-65 are now rejected as follows.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 12-65 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claims 12, 22, 24, 28, 37, 43, and 58, the phrase "can be" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Claims 13-21, 24, 25-27, 29-36, 38-42, 44-57, and 59-65 are dependent on Claims 12, 22, 24, 28, 37, 43, and 58, and hence inherit the deficiencies of Claims 12, 22, 24, 28, 37, 43, and 58.

10. Claims 12-65 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 12, 22, 24, 28, 37, 43, and 58 all recite the limitation that only undiffracted light be detected by the detector means. However, it is unclear in these claims where such undiffracted light is generated from. For the purposes of examination, the Examiner has taken this to mean '...only undiffracted light scattered or generated from the sample and incident on the light diffracting means is detected by the detector means.' Claims 13-21, 24, 25-27, 29-36, 38-42, 44-57, and 59-65 are dependent on Claims 12, 22, 24, 28, 37, 43, and 58, and hence inherit the deficiencies of Claims 12, 22, 24, 28, 37, 43, and 58.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 12-18, 20, 22-32, 37-39, 43-45, 49, 53-55, 57, 63-65, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (U.S. Patent No. 5691839), of record, in view of Trutna, Jr. (U.S. Patent No. 4631416).

Kobayashi discloses a fluorescence scanning confocal microscope (See Figure 1), comprising a radiation source such as a laser (See 1 in Figure 1; col. 4, line 64-col. 5, line 14) which emits excitation light for irradiating a sample (See 15 in Figure 1); a detection device (See 26 in Figure 1) for detection of emission light emitted by the sample; an excitation and detection pinhole (See 24 in Figure 1); microscope optics (See for example 9-14, 16-22 in Figure 1) for directing excitation light to the sample and for directing emission light back in the direction of the radiation source and detection device; a plurality of acousto-optic elements (See either 4 or 8 in Figure 1; inherently, such acousto-optical devices are able to adjust the intensity, wavelength of the incident light based on adjustments on the applied acoustic wave on the Bragg cell of the acousto-optical device) for diffracting excitation light into multiple orders, such as the zero and first order (See col. 8, lines 25-39) and for separating excitation light and emission light (The Examiner notes that the system of Figure 1 is used for fluorescence measurements;

AOD 4 operates on diffraction principles and thus has wavelength-dependent diffracting characteristics; and both scattered fluorescence and source wavelengths pass through AOD 4) and which is positioned between the radiation source and microscope optics in such a way that diffracted excitation light can be introduced into the microscope optics, wherein the emission light emitted by the sample has fractions of excitation light and fractions of wavelength-shifted fluorescence light (it is noted that upon excitation by the source, the sample will emit its characteristic fluorescence, as well as specularly and diffusely reflect and transmit a portion of the source light), excitation light emitted by the sample can be deflected in the direction of the radiation source by diffraction by the acousto-optic device, and wavelength-shifted fluorescence light emitted by the sample can be transmitted through the acousto-optic element and is spatially separable from excitation light fractions of the emission light, and wherein the detection device is so positioned with respect to the acousto-optic element that wavelength-shifted fluorescence light transmitted through the acousto-optic element can be detected by means of the detection device, and further comprising a filter device (See 25F in Figure 1) which for the selective detection of wavelength-shifted fluorescence light in the detection device is positioned between the acousto-optic element and the detection device, and at least one reflecting element (See 4, 8, or 2 in Figure 1) for influencing the light direction and for separating the light fractions, which is located in at least one of an excitation beam path upstream of the acousto-optic element and a detection beam path downstream of the acousto-optic element. Kobayashi lacks the detection device and the acousto-optical means being positioned with respect to each other and the beam path such that only

undiffracted light is detected by the detector device. However, Trutna, Jr. teaches an optical system (See for example Figure 3) utilizing a transmission grating (See for example 31, 32 in Figure 3), wherein light scattered from a sample (See 33 in Figure 3) is sent back through the transmission grating which splits the scattered light into multiple orders (See 310 in Figure 3). The multiple orders of light are sent through an aperture (See 313, 314 in Figure 3) to filter out all orders except for the undiffracted zero order, which is detected by the photomultiplier tube (See 317 in Figure 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the detection device and the acousto-optical means be positioned with respect to each other and the beam path such that only undiffracted light is detected by the detector device, as taught by Trutna, Jr., in the fluorescence scanning confocal microscope of Kobayashi, for the purpose of blocking and rejecting stray light from entering the detection system, thus increasing the signal-to-noise ratio of the optical system.

13. Claims 19, 21, 33-36, 40-42, 46-48, 51, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of Trutna, Jr.

With regard to Claims 21, 33-36, Kobayashi in view of Trutna, Jr. discloses the invention as set forth above, except for the optical element being a light refracting element, such as an unvaporized prism. The Examiner notes that the optical element of Kobayashi (See for example 2 in Figure 1) is a simple wavelength dependent beamsplitter performing a light fraction separation function. It is well known in the art that prisms similarly perform such a wavelength separation function based on the

refractive properties of the prism material. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the optical element be a light refracting element, such as an unvaporized prism, for the purpose of simplifying the optical layout of the system and reducing the cost, size, and weight of the system.

With regard to Claim 40, Kobayashi in view of Trutna, Jr. discloses the invention as set forth above, except for the reflecting element being a vaporized prism. The Examiner notes that the optically dispersive properties of a prism are not actually critical to the function of the fluorescence microscope in this embodiment, and hence the vaporized prism only acts as a reflector for the purpose of performing a light fraction separation function. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the reflecting element be a vaporized prism for the purpose of simplifying the optical layout of the system and reducing the cost, size, and weight of the system.

With regard to Claims 19, 41-42, 51, Kobayashi in view of Trutna, Jr. discloses the invention as set forth above. In particular, Kobayashi in view of Trutna, Jr. discloses the acousto-optic elements being acousto-optic deflector elements. Kobayashi in view of Trutna, Jr. lacks these acousto-optic deflector elements being an acousto-optic modulator and then an acousto-optic tunable filter in the direction of the microscope optics. The Examiner notes that it is well known in the art that acousto-optic deflectors, modulators, and tunable filters are all the same devices based on the acousto-optic effect in a Bragg cell. Hence all diffract, modulate, and tune light in the same way, based on the applied

acoustic wave onto the device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the acousto-optic deflectors be an acousto-optic modulator and then an acousto-optic tunable filter in the direction of the microscope optics for the purpose of providing additional intensity and wavelength adjustability for optimizing the operation of the fluorescence microscope.

With respect to Claims 46-48, Kobayashi in view of Trutna, Jr. discloses the invention as set forth above, except for the fluorescence microscope further including at least one glass fiber provided for feeding in excitation light. It is well known in the art of optical microscopy and optical spectroscopy to utilize optical fibers to guide excitation light from a source to a sample, as well as to guide emission light from a sample to a detection system, for the purpose of reducing the optical system complexity, size, cost, and weight, as well as for providing a flexible means of routing light within the optical system.

14. Claims 50, 52, 56, 58-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of Trutna, Jr. as applied to Claims 12, 22, 24, 28, 37, and 43 above, and further in view of Asakawa (JP 01282515), of record.

With regard to Claims 50, 52, 58-62, Kobayashi in view of Trutna, Jr. discloses the invention as set forth above in Claims 12, 22, 24, 28, 37, and 43, except for the radiation source being constructed as a plurality of lasers having different wavelengths and a plurality of acoustic-optical elements being provided and with each laser is associated at least one acousto-optical element. However, Asakawa teaches an optical microscope (See Figures 1 or 4) wherein the optical source and acousto-optical devices are provided as a plurality of optical laser sources (See 1, 2, 3 of Figure 1 or 4) and as a plurality of

acousto-optical modulator devices (See 7, 8, 9 in Figures 1 or 4), respectively, such that different wavelengths can be simultaneously fed into the microscope beam path (See Figures 1 or 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the radiation source be constructed as a plurality of lasers having different wavelengths and a plurality of acoustic-optical elements be provided and with each laser is associated at least one acousto-optical element, as taught by Asakawa, in the fluorescence microscope of Kobayashi in view of Trutna, Jr., for the purpose of simplifying the optical detection system as well as reduce the cost of the optical system.

Further, with regard to Claim 56, Kobayashi in view of Trutna, Jr., and further in view of Asakawa discloses the invention as set forth above. Asakawa additionally discloses that the light beams of the three lasers (See 1, 2, 3 in Figure 1 or 4) are switchable in order with time according to the applied high frequency signal applied to the acousto-optical modulator (See 7, 8, 9 in Figures 1 or 4; Abstract). However, Kobayashi in view of Trutna, Jr., and further in view of Asakawa lacks the radiation of the plurality of lasers being fed into the microscope path in a sequence based on decreasing wavelength. It would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the timing sequence of the lasers of Kobayashi in view of Trutna, Jr., and further in view of Asakawa such that the radiation of the plurality of lasers are fed into the microscope path in a sequence based on decreasing wavelength since the order or sequence of the radiation of the lasers entering the microscope beam path is not critical to the operation of the function of the fluorescence microscope, and one skilled in the art

would know to adjust the order or sequence based on time of arrival of the excitation pulse onto the sample, as per the intended application.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 703-305-4007. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST. **Please note that after January 20, 2004, the examiner may be reached at the new telephone number: 571-272-2315.**

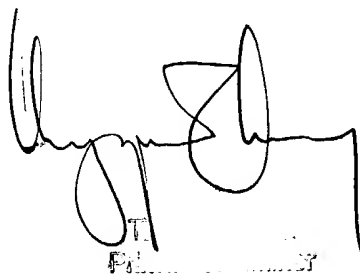
Art Unit: 2872

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 703-305-0024. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1782.



Arnel C. Lavarias
1/12/04



FILED